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The coming cooling: Usefully accurate climate forecasting for policy makers

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ABSTRACT
This paper argues that the methods used by the establishment climate science community are not fit for purpose and that a new forecasting paradigm should be adopted. Earth's climate is the result of resonances and beats between various quasi-cyclic processes of varying wavelengths. It is not possible to forecast the future unless we have a good understanding of where the earth is in time in relation to the current phases of those different interacting natural quasi periodicities. Evidence is presented specifying the timing and amplitude of the natural 60+/- year and, more importantly, 1,000 year periodicities (observed emergent behaviors) that are so obvious in the temperature record. Data related to the solar climate driver is discussed and the solar cycle 22 low in the neutron count (high solar activity) in 1991 is identified as a solar activity millennial peak and correlated with the millennial peak -inversion point - in the RSS temperature trend in about 2003. The cyclic trends are projected forward and predict a probable general temperature decline in the coming decades and centuries. Estimates of the timing and amplitude of the coming cooling are made. If the real climate outcomes follow a trend which approaches the near term forecasts of this working hypothesis, the divergence between the IPCC forecasts and those projected by this paper will be so large by 2021 as to make the current, supposedly actionable, level of confidence in the IPCC forecasts untenable.

1. The Problems with the IPCC - GCM Climate Forecasting methods.

Climate forecasts are made by the IPCC using analytic numerical models called General Circulation Models (GCMs) which attempt to describe the climate dynamics using sets of differential equations. This modelling approach is of limited value for predicting future temperature with any calculable certainty because of the difficulty of sampling or specifying the

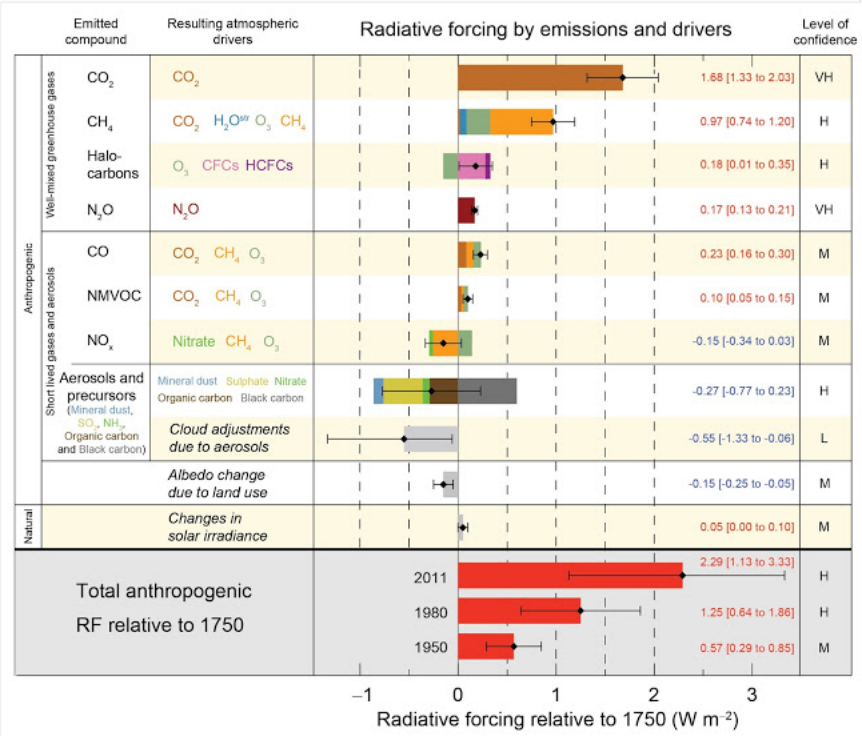

Fig. 1 Radiative Forcing by Emissions and Drivers Fig SPM-05 (2)

Fig. 1 shows Very High Confidence for the C02 forcing. The SPM (2), page 17, states: "Greenhouse gases contributed a global mean surface warming likely to be in the range of 0.5°C to 1.3°C over the period 1951 to 2010, with the contributions from other anthropogenic forcings, including the cooling effect of aerosols, likely to be in the range of -0.6°C to 0.1°C. The contribution from natural forcings is likely to be in the range of -0.1°C to 0.1°C, and from natural internal variability is likely to be in the range of -0.1°C to 0.1°C."

Collins et al 2006 (3) discus the implications for interpreting variations in forcing and response across the multi-model ensemble of coupled Atmosphere-Ocean General Circulation Models (AOGCMs) used in the IPCC AR4 report. Because of the complexity of the processes included in these models, it is necessary to parameterize or simplify these processes. The lack of observational or theoretical constraints has resulted in a diversity of parameterizations for many forcing components of the climate system. Different AOGCMs have different atmospheric profiles. The calculations in the Collins paper omit the effects of stratospheric thermal adjustment to forcing derived by using fixed dynamical heating. The inter-comparison is based upon calculations of the instantaneous changes in clear-sky fluxes when concentrations of the well mixed greenhouse gasses are perturbed. While the relevant quantity for climate change is all-sky forcing, the introduction of clouds greatly complicates the inter-comparison exercise and therefore clouds are omitted from Collins RTMIP (The Radiative Transfer Model Inter-comparison Project) study. Collins states: "in many cases, there are substantial discrepancies among the AOGCMs and between the AOGCMs and LBL codes." Collins concludes: "The reasonable accuracy of

multi-model projections have been explored, but there is still no agreed strategy for weighting the projections from different models based on their historical performance so that there is no direct means of translating quantitative measures of past performance into confident statements about fidelity of future climate projections.The use of a multi-model ensemble in the IPCC assessment reports is an attempt to characterize the impact of parameterization uncertainty on climate change predictions. The shortcomings in the modeling methods, and in the resulting estimates of confidence levels, make no allowance for these uncertainties in the models. In fact, the average of a multi-model ensemble has no physical correlate in the real world.

The IPCC AR4 SPM report section 8.6 deals with forcing, feedbacks and climate sensitivity. It recognizes the shortcomings of the models. Section 8.6.4 concludes in paragraph 4 (4):
"Moreover it is not yet clear which tests are critical for constraining the future projections, consequently a set of model metrics that might be used to narrow the range of plausible climate change feedbacks and climate sensitivity has yet to be developed"

What could be clearer? The IPCC itself said in 2007 that it doesn't even know what metrics to put into the models to test their reliability. That is, it doesn't know what future temperatures will be and therefore can't calculate the climate sensitivity to CO2. This also begs a further question of what erroneous assumptions (e.g., that CO2 is the main climate driver) went into the "plausible" models to be tested any way. The IPCC itself has now recognized this uncertainty in estimating CS – the AR5 SPM says in Footnote 16 page 16 (5): "No best estimate for equilibrium climate sensitivity can now be given because of a lack of agreement on values across assessed lines of evidence and studies." Paradoxically the claim is still made that the UNFCCC Agenda 21 actions can dial up a desired temperature by controlling CO2 levels. This is cognitive dissonance so extreme as to be irrational. There is no empirical evidence which requires that anthropogenic CO2 has any significant effect on global temperatures.

The climate model forecasts, on which the entire Catastrophic Anthropogenic Global Warming meme rests, are structured with no regard to the natural 60+/- year and, more importantly, 1,000 year periodicities that are so obvious in the temperature record. The modelers approach is simply a scientific disaster and lacks even average commonsense. It is exactly like taking the temperature trend from, say, February to July and projecting it ahead linearly for 20 years beyond an inversion point. The models are generally back-tuned for less than 150 years when the relevant time scale is millennial. The radiative forcings shown in Fig. 1 reflect the past assumptions. The IPCC future temperature projections depend in addition on the Representative Concentration Pathways (RCPs) chosen for analysis. The RCPs depend on highly speculative scenarios, principally population and energy source and price forecasts, dreamt up by sundry sources. The cost/benefit analysis of actions taken to limit CO2 levels depends on the discount rate used and allowances made, if any, for the positive future positive economic effects of CO2 production on agriculture and of fossil fuel based energy production. The structural uncertainties inherent in this phase of the temperature projections are clearly so large, especially when added to the uncertainties of the science already discussed, that the outcomes provide no basis for action or even rational

and perhaps only understood, in terms of observed, emergent behavior. The practical implication is that there exist system behaviors and structures that are not amenable to explanation or prediction by reductionist methodologies. The search for objective constraints with which to reduce the uncertainty in regional predictions has proven elusive. The problem of equifinality ……. that different model structures and different parameter sets of a model can produce similar observed behavior of the system under study - has rarely been addressed." A new forecasting paradigm is required.

2. The Past is the Key to the Present and Future. Finding then Forecasting the Natural Quasi-Periodicities Governing Earth's Climate - a Geological Approach.

2.1 General Principles.

The core competency in the Geological Sciences is the ability to recognize and correlate the changing patterns of events in time and space. This requires a set of skills different from the reductionist and mathematical/statistical approach to nature, but which is essential for investigating past climates and forecasting future climate trends. It is necessary to build an understanding of the patterns and a narrative of general trends from an integrated overview of the actual individual local and regional time series of particular variables. Earth's climate is the result of resonances and beats between various quasi-cyclic processes of varying wavelengths. It is not possible to forecast the future unless we have a good empirical understanding of where the earth is in time in relation to the current phases of those different interacting natural quasi periodicities which include the principal components of the observed emergent phenomena. When analyzing or comparing data time series geologists refer to a stratigraphic unit that serves as the standard of reference as a "type section". In climatology it is useful when illustrating hypotheses to talk in terms of "type reconstructions". Mann's "Hockey Stick" is the iconic example. It is necessary also to be cognizant of the fact that the emergent time series will reflect turning points and threshold effects in the underlying physical process interactions. Such turning points mark the major inflection points in temperature and solar activity time series and serve as geologists would say as "golden spikes" when analyzing and forecasting temperature and solar activity trends.

2.2 The Present Warming in Relation to the Milankovitch and Millennial Cycles

Fig. 2 shows that Earth is past the warm peak of the current Milankovitch interglacial and has been generally cooling for the last 3,500 years.

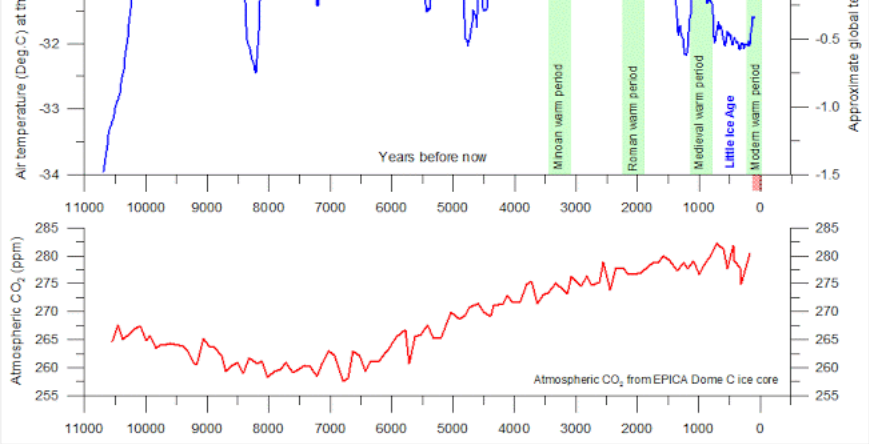

Fig. 2 Greenland Ice core derived temperatures and CO2 from Humlum 2016 (8)

The millennial cycle peaks are obvious at about 10,000, 9,000, 8,000, 7,000, 2,000, and 1,000 years before now as seen in Fig. 2 (8) and at about 990 AD in Fig. 3 (9). It should be noted that those believing that CO2 is the main driver should recognize that Fig. 2 would indicate that from 8,000 to the Little Ice Age CO2 must have been acting as a coolant.

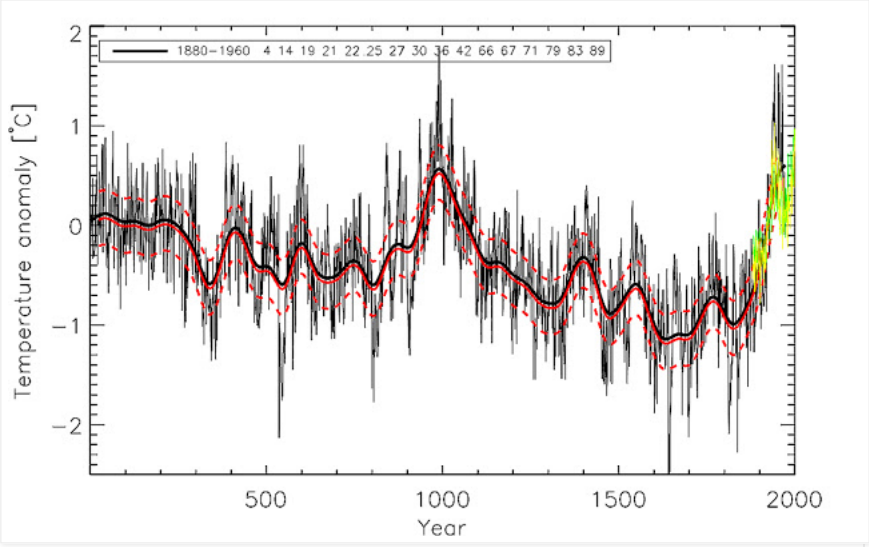

Fig.3 Reconstruction of the extra-tropical NH mean temperature Christiansen and Ljungqvist 2012. (9) (The red line is the 50 year moving average.)

Any discussion or forecast of future cooling must be based on a wide knowledge of the most important reconstructions of past temperatures, after all, the hockey stick was instrumental in selling the CAGW meme to the grant awarders, politicians, NGOs and the general public.

The following papers trace the progressive development of the most relevant reconstructions starting with the hockey stick: Mann et al 1999. Fig. 3 (10), Esper et al 2002 Fig. 3 (11), Mann's later changes - Mann et al 2008 Fig. 3 (12), and Mann et al 2009 Fig. 1 (13). The later 2012 Christiansen and Ljungqvist temperature time series of Fig. 3 is here proposed as the most useful

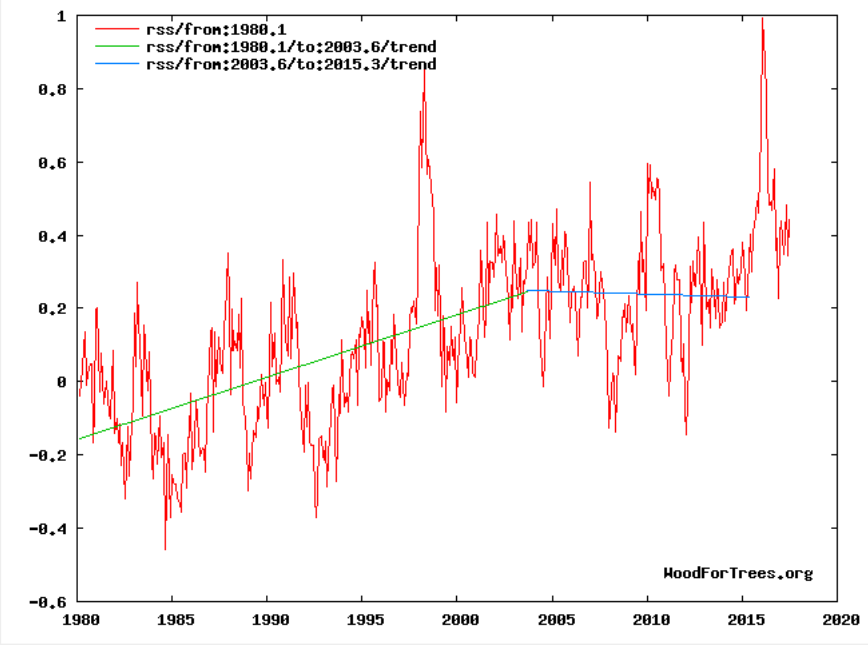

Fig 4. RSS trends showing the millennial cycle temperature peak at about 2003 (14)

Figure 4 illustrates the working hypothesis that for this RSS time series the peak of the Millennial cycle, a very important "golden spike", can be designated at 2003.

The Hadcrut 4gl data trends are very similar to the UAH data trends with the millennial peak at 2005.3 in Fig. 5 (15).

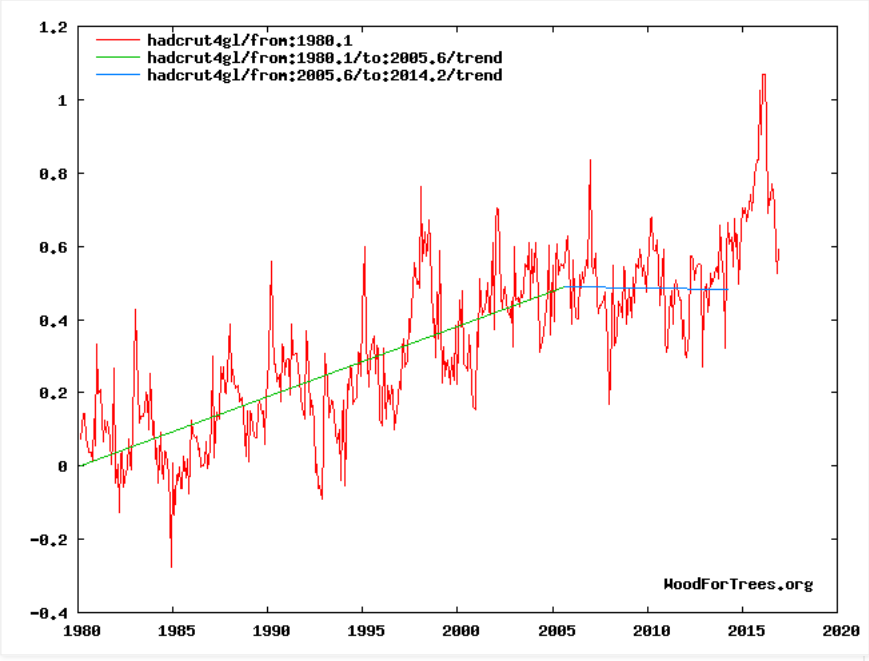

Fig. 5 Hadcrut 4gl trends showing the millennial cycle temperature peak at about 2005.6

This is remarkably consistent with the 1,024-year periodicity seen in the solar activity wavelet analysis in Fig. 4 from Steinhilber et al 2012 (16).Fairbridge and Sanders 1987 (17) p 452 provide the commensurability relationships of planetary and lap periodicities as a basis for future analysis of the sun-climate connection. Their reported Uranus Saturn Jupiter Lap time periodicity of 953 years is pertinent. here. Scafetta 2013 (18) compares the GCMs with a semi-empirical harmonic climate model based chiefly on astronomical oscillations. The model is constructed from six astronomically deduced harmonics with periods of 9.1, 10.4, 20, 60, 115 and 983 years. Scafetta's abstract also states: "In particular, from 2000 to 2013.5 a Global Surface Temperature plateau is observed while the GCMs predicted a warming rate of about 2 C/century. In contrast, the hypothesis that the climate is regulated by specific natural oscillations more accurately fits the GST records at multiple time scales."

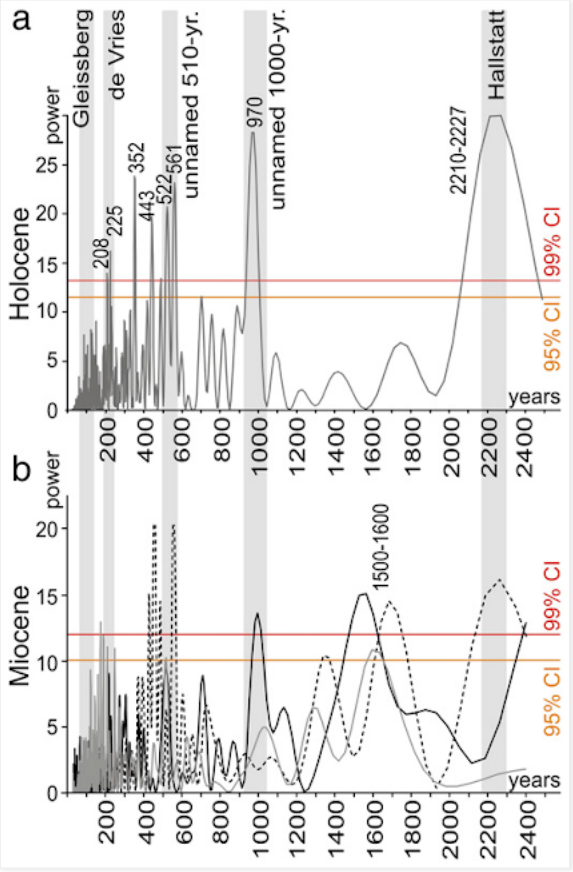

Fig.6 A comparison of the periodograms of (a) the Holocene sunspot activity with (b) time converted periodograms of the Miocene proxy data (19).

Kern 2012 (19) presents strong evidence for the influence of solar cycles during the Holocene and in a Late Miocene lake system. It is noteworthy that the Millennial periodicity is persistent and identifiable throughout the Holocene Figs. 2 and 6 and in the Miocene - 10.5 million years ago Fig.6. The prominent Millennial unnamed peak in Fig. 6a above is also seen in Scaffetta's Fig. 10 in the C-14 data (20) and is correlated with the Eddy cycle with a suggested period of 900 to 1050 years.

2.3 The Quasi-Millennial Temperature Cycle – Amplitude.

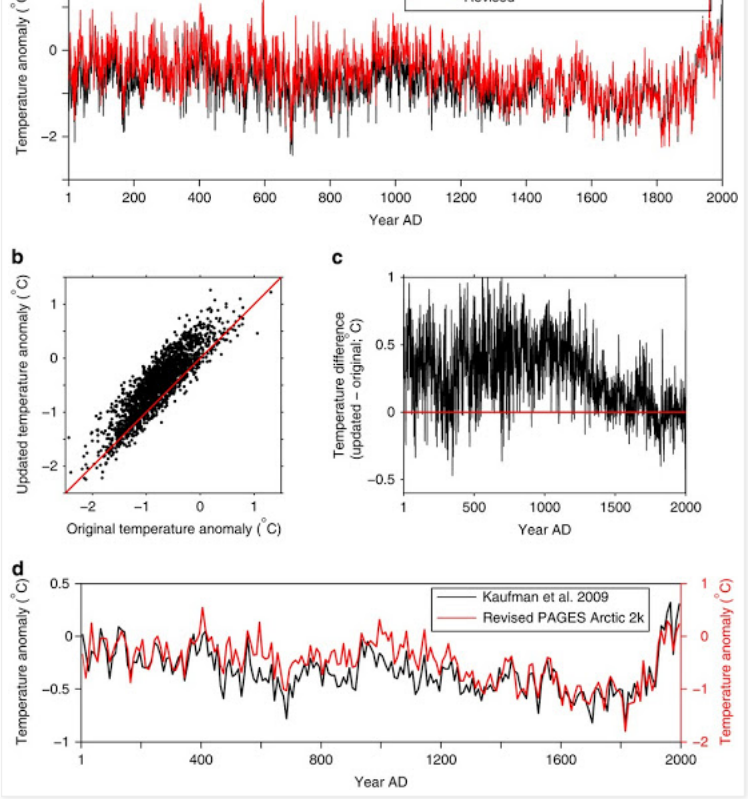

Fig 7 Effect of revising the PAGES Arctic 2k database on the Arctic annual temperature reconstruction published recently by the PAGES 2k Consortium1(22)

(a) Reconstruction calculated using the original (black) and updated database presented here (red). (b) Scatter plot illustrating the influence of the revisions; 1:1 line shown in red. (c) Time-series of the differences in reconstructed temperature (revised—original); no change shown as red line. (d) Comparison between Kaufman et al. 7 Arctic—wide temperature reconstruction and the revised PAGES 2k Arctic reconstruction (averaged to decadal values). Note the factor-of-two difference in the temperature scales.

It is important to note that in Fig. 7d the end 20th century warming peaks at about the same temperature as the MWP peak at about 1,000 AD, contrary to the expectations of the CAGW establishment.

2.4 The sixty year +/- cycle

Over the last 135 years an approximate 60 year periodicity is clearly present in the temperature data.

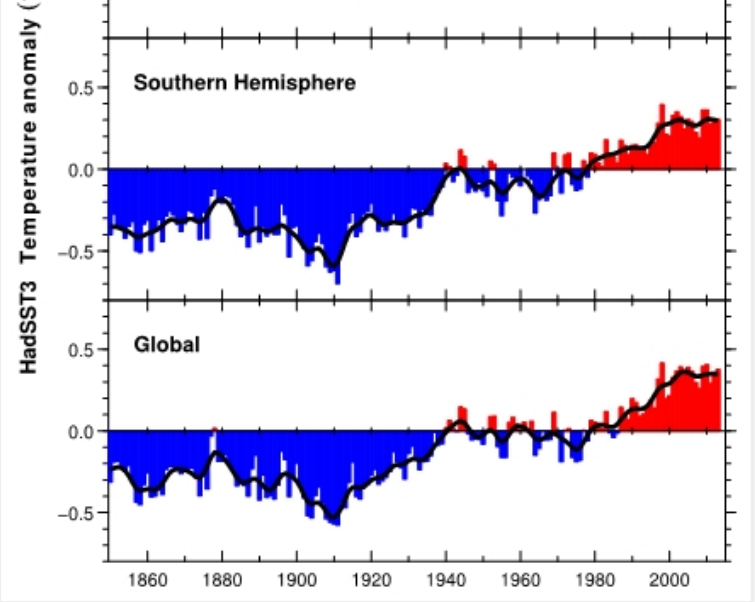

Fig. 8 HadSST3 Temperature Anomaly (23)

The global SST data shows cooling from 1880 to 1910, warming from 1910 to 1944, cooling from 1944 to 1974, warming from 1974 to 2004 and cooling since then. This 60-year +/- periodicity in Fig. 8 modulates the underlying longer wave 1,000-year periodicity seen in Figs. 3, 6 and 7 above by about 0.5 degrees per 60-year cycle. This 60-year cycle is also well documented in Figs.1 and 3 in the Scaffetta paper referenced previously (18) and in Fig. 2a and b Gervais 2016 (24), which paper also suggests a TCR of 0.6 and questions the entire dangerous warming paradigm.

2.5 The Solar Driver.

The most useful proxies for solar "activity" are the 10Be data and the Neutron count. The general increase in solar activity since the Little Ice Age is obvious in the decrease in the NGRIP and Dye -3 ice core 10 Be flux data between about 1700 and the late twentieth century.

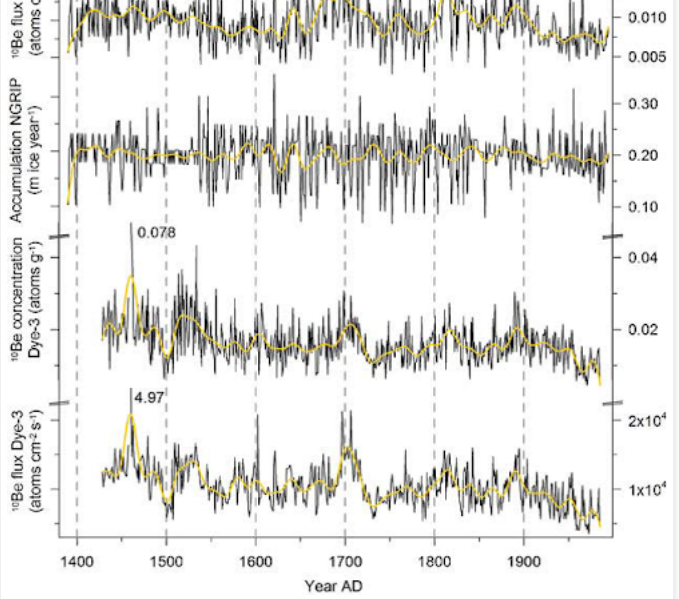

Fig. 9 Berggren et al 2009 A 600-year annual 10Be record from the NGRIP ice core Greenland (25)

Steinhilber Figure 3 BCD (26) shows the correlation of the various climate minima within the last 1,000 years to 10Be cosmic ray intensities. Temperature drives CO2, water vapor concentrations, and evaporative and convective cooling independently. The whole CAGW - GHG scare is based on the obvious fallacy of putting the effect before the cause. Unless the range and causes of natural variation, as seen in the natural temperature quasi-periodicities, are known within reasonably narrow limits it is simply not possible to even begin to estimate the effect of anthropogenic CO2 on climate. Given the lack of any empirical CO2-climate connection reviewed earlier and the inverse relationship between CO2 and temperature seen in Fig. 2, and for the years 2003– 2015.3 in Fig. 4, during which CO2 rose 20 ppm, the simplest and most rational working hypothesis is that the solar "activity" increase is the chief driver of the global temperature increase since the LIA.

Based on Fig. 9 and the Oulu neutron count in Fig. 10 (27) and the evidence for the temperature peak from Figures 3, 4, and 5, it is reasonable to conclude that the solar activity millennial maximum peaked with a solar activity "Golden Spike" in Cycle 22 at about 1991.

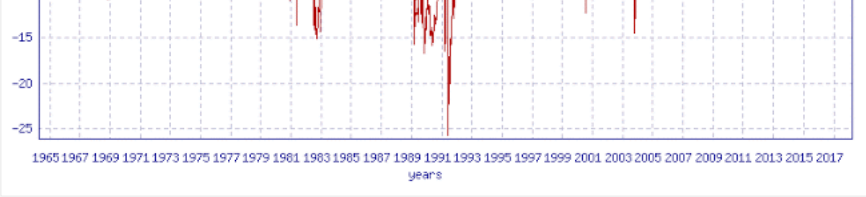

Fig. 10 Oulu Neutron Monitor data (27)

The connection between solar "activity" and climate is poorly understood and highly controversial. Solar "activity" encompasses changes in solar magnetic field strength, IMF, GCRs, TSI, EUV, solar wind density and velocity, CMEs, proton events, etc. The idea of using the neutron count and the 10Be record as the most useful proxy for changing solar activity and temperature forecasting is agnostic as to the physical mechanisms involved. Having said that, however, it seems likely that the three main solar activity related climate drivers are the changing GCR flux - via the changes in cloud cover and natural aerosols (optical depth), the changing EUV radiation producing top down effects via the Ozone layer, and the changing TSI - especially on millennial and centennial scales. The effect on observed emergent behaviors i.e. global temperature trends of the combination of these solar drivers will vary non-linearly depending on the particular phases of the eccentricity, obliquity and precession orbital cycles at any particular time convolved with the phases of the millennial, centennial and decadal solar activity cycles and changes in the earth's magnetic field. Because of the thermal inertia of the oceans there is a varying lag between the solar activity peak and the corresponding peak in the different climate metrics. There is a 13+/- year delay between the solar activity "Golden Spike" 1991 peak and the millennial cyclic "Golden Spike" temperature peak seen in the RSS data at 2003 in Fig. 4. It has been independently estimated that there is about a 12-year lag between the cosmic ray flux and the temperature data - Fig. 3 in Usoskin (28).

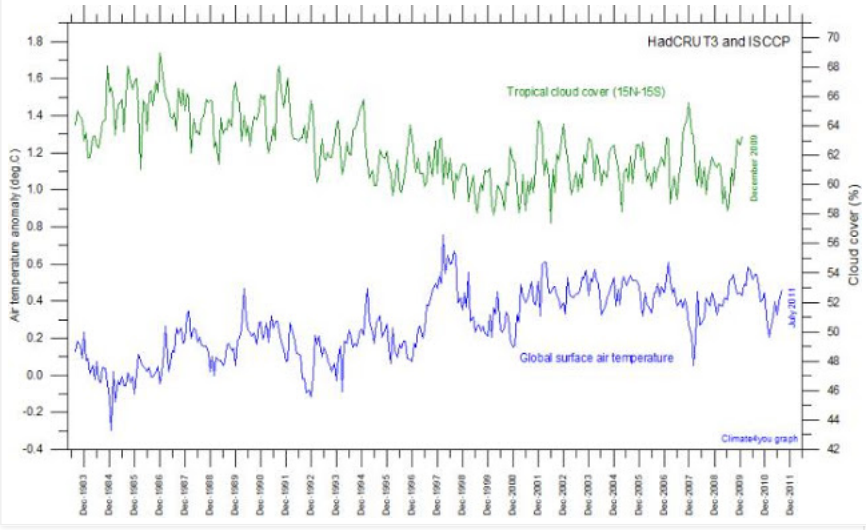

Fig.11 Tropical cloud cover and global air temperature (29)

minimum is 21 years (30). It is simple and natural to correlate the cycle 22 low in the neutron count (high solar activity) in 1991 with the millennial temperature peak and trend inversion in the RSS in 2003 with the solar activity 1991 Golden Spike, and to project forward a probable general temperature decline for the coming decades and centuries. Lags differ between data sets because of the real geographical area differences, proxy data point selection differences and instrumental differences between different proxy time series.

3. Future Temperature Trends

To summarize, the forecasts which follow rely on four basic working hypotheses. First, the solar millennial activity cycle peaked in 1991+/- as seen in Fig 10 in the Oulu neutron count. Second, the corresponding millennial temperature cycle peaked in the RSS data at about 2003-Fig. 4.Third, the 60 year temperature cycle peaked at about the same time and fourth, Ockham's razor would suggest that the simplest working hypothesis currently available, based on the weight of all the data, is that the trends from the 990 Millennial peak to the 2003 Millennial cycle peak seen in Figs 3 and 4 will, in general, repeat from 2003 to 3004.

3.1 Long Term.

The depths of the next LIA will likely occur about 2640 +/-. In the real world no pattern repeats exactly because other things are never equal. Look for example at the short-term annual variability about the 50-year moving average in Fig. 3. The actual future pattern will incorporate other solar periodicities in addition to the 60-year and millennial cycles, and will also reflect extraneous events such as volcanism. However, these two most obvious cycles should capture the principal components of the general trends with an accuracy high enough, and probability likely enough, to guide policy. Forward projections made by mathematical curve fitting alone have no necessary connection to reality if turning points picked from empirical data in Figs 4 and 10 are ignored.

3.2 Medium Term Forecast to 2100

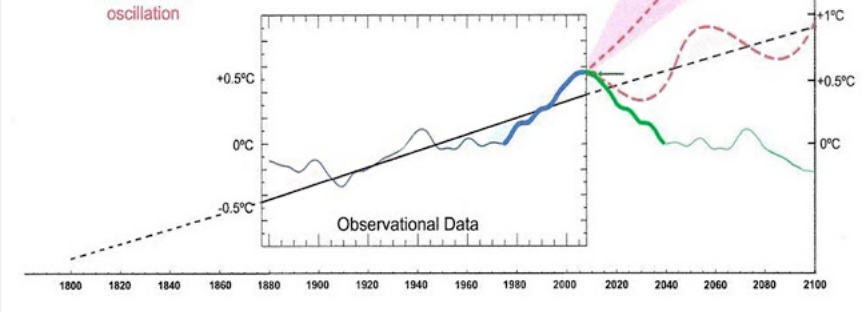

Fig. 12. Comparative Temperature Forecasts to 2100.

Fig. 12 compares the IPCC forecast with the Akasofu (31) forecast (red harmonic) and with the simple and most reasonable working hypothesis of this paper (green line) that the "Golden Spike" temperature peak at about 2003 is the most recent peak in the millennial cycle. Akasofu forecasts a further temperature increase to 2100 to be 0.5°C ± 0.2C, rather than 4.0 C +/- 2.0C predicted by the IPCC. but this interpretation ignores the Millennial inflexion point at 2004. Fig. 12 shows that the well documented 60-year temperature cycle coincidentally also peaks at about 2003.Looking at the shorter 60+/- year wavelength modulation of the millennial trend, the most straightforward hypothesis is that the cooling trends from 2003 forward will simply be a mirror image of the recent rising trends. This is illustrated by the green curve in Fig. 12, which shows cooling until 2038, slight warming to 2073 and then cooling to the end of the century, by which time almost all of the 20th century warming will have been reversed. Easterbrook 2015 (32) based his 2100 forecasts on the warming/cooling, mainly PDO, cycles of the last century. These are similar to Akasofu's because Easterbrook's Fig 5 also fails to recognize the 2004 Millennial peak and inversion. Scaffetta's 2000-2100 projected warming forecast (18) ranged between 0.3 C and 1.6 C which is significantly lower than the IPCC GCM ensemble mean projected warming of 1.1C to 4.1 C. The difference between Scaffetta's paper and the current paper is that his Fig.30 B also ignores the Millennial temperature trend inversion here picked at 2003 and he allows for the possibility of a more significant anthropogenic CO2 warming contribution.

3.3 Current Trends

The cooling trend from the Millennial peak at 2003 is illustrated in blue in Fig. 4. From 2015 on, the decadal cooling trend is temporally obscured in the RSS temperature data by the recent El Nino. The El Nino peaked in February 2016. Thereafter to the end of 2019 we might reasonably expect a cooling at least as great as that seen during the 1998 El Nino decline in Fig. 4, or about 0.9 C. It is worth noting that the increase in the neutron count in 2007-9 seen in Fig. 10 indicates a possible solar regime change, which might produce an unexpectedly sharp decline in RSS temperatures 12 years later from 2019-21 to levels significantly below the blue cooling trend line in Figs. 4 and 5. This suggestion was also made in Easterbrook's conclusions. (32)

4. Conclusions.

and then incorporate, the phase of the millennial and 60-year cycles in particular, useful forecasting is simply impossible. I would, in contrast, contend that by adopting the appropriate time scale and method for analysis, a commonsense working hypothesis with sufficient likely accuracy and chances of success to guide policy has been formulated here. The UNEP, IPCC and UNFCCC rely heavily on the "precautionary principle" to motivate their agendas and action plans. The working hypothesis proposed here provides a broad overview of future climate trends for the N H This could be the basis for a more realistic and useful application of the principle. In reality, there is very substantial climate variability between the earth's different geographical regions. It would be prudent to designate regional Type Reconstructions and Solar and temperature Golden Spikes and then build regional narratives of climate trends for the past 2000 years. In order to increase the accuracy, precision and practical value of forecasts, the earth might then be usefully divided up into the following climate "Plates":

1 Northern Hemisphere

2 Southern Hemisphere

3 East Pacific -North America –W Atlantic

4 East Atlantic - Western Europe

5 Russia

6 China

7 India and SE Asia

8 Australasia and Indonesia

9 South America

10 N. Africa

11 Sub-Saharan Africa

12 The Arctic

13 The Antarctic

14 The Intra-tropical Pacific Ocean (detailed analysis of the energy exchanges and processes at the ocean /atmosphere interface in this area is especially vital because its energy budget provides the key to the earth's thermostat)

his time under four headings which he called idols. The fourth of these were described as: "Idols of the Theater are those which are due to sophistry and false learning. These idols are built up in the field of theology, philosophy, and science, and because they are defended by learned groups are accepted without question by the masses. When false philosophies have been cultivated and have attained a wide sphere of dominion in the world of the intellect they are no longer questioned. False superstructures are raised on false foundations, and in the end systems barren of merit parade their grandeur on the stage of the world."

Acknowledgements

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Posted by Dr Norman Page at 8:09 AM

7 comments:

Anonymous May 29, 2017 at 3:24 PM

Thank you for a great article. I enjoyed the conclusions that were presented. Of course, the author used scientific data and analysis from sources that I recognized as being credible. I arrived at the basic same conclusions based on many sources. My interest in Climate change began after the "Hockey Stick" coverup first appeared. It became more of an interest when further discrepancies surfaced. Knowledgeable scientists helped me cement my opinions that AGW was false and when political pressures began to spread their form of propaganda. The scientists who influenced my thinking included He3nik Svensmark, Dyson Freeman, Don Easterbrook and many other sources including publications such as Debunk, WUWT, CFACT etc.

Reply

Dr Norman Page May 30, 2017 at 6:05 PM

Thanks for your kind words. Anything you can do to spread the word by providing links to this website or the paper on social media or climate web sites would be appreciated.

Reply

Science or Fiction July 12, 2017 at 4:15 PM

I have previously noted the IPCC statement you cite:
Note 16: "No best estimate for equilibrium climate sensitivity can now be given because of a lack of agreement on values across assessed lines of evidence and studies."

I think you have a very clear take on the position United Nations take on that basis:
"Paradoxically the claim is still made that the UNFCCC Agenda 21 actions can dial up a desired temperature by controlling CO2 levels. This is cognitive dissonance so extreme as to be irrational."

I wish policy makers would read that Note 16 and understand what it means – as you did.

I have tried to calculate and compare the predictions by IPCC with observations of ocean warming after 2005. I run into problems finding the central estimate by IPCC, by the reasons you have also identified. I found that the likely range of climate sensitivity will allow more or less any amount of ocean warming. It is really hard to falsify a theory that allows any amount of warming. It will take cooling to falsify the theory expressed by the figures IPCC provides. This is documented in my post:
IPCC got all bets covered

This is what I found:
"IPCC states that the climate feedback parameter is "likely" between 2,47 and 0,82 (W/m2*K). This corresponds to an equilibrium climate sensitivity of 1.5°C and 4.5°C respectively. IPCC also states that: "no best estimate for equilibrium climate sensitivity can be given because of a lack of agreement on values across assessed lines of evidence and studies".

To deduce the range of ocean warming allowed by the theory put forward by IPCC I use the following figures:
IPCC estimate for anthropological radiative forcing:
2,3 W/m2 for 2011
And, the highest and lowest climate feedback parameters provided by IPCC:
2,5 W/m2*K and 0,82 W/m2*K

Based on these figures the theory put forward by IPCC would allow warming of the oceans anywhere in the range from 0,0043 K to 0,087 K.

As there are also other uncertainties, I will allow myself to round off the figures. The theory put forward by

the future by Fourier synthesis. However, Fourier analysis can not tell us if the periods, amplitudes, and waveforms that are used to fit the time series actually exists. Most likely they don´t. Fourier analysis does not identify any of the physical relationships that affects the measurand.

If curve fitting really could get to the underlying causal structures of a time series, I guess we would all be rich from the stock market: http://chebscan.com/fourierPredict/

Reply

Replies

Bill December 18, 2017 at 1:47 PM

The stock market is clearly a random process as confirmed by historical data. Hence, curve fitting is useless as you contend. However, historical records of global temperature, correlated with solar system orbital dynamics have consistently trended. Hence, curve fitting becomes a meaningful process. Not perfect but meaningful.

Reply

Science or Fiction July 12, 2017 at 5:24 PM

"If the real climate outcomes follow trends which even approach the near-term forecasts in paragraph 3.3 above, the divergence between the IPCC forecasts and those projected by this paper in Fig. 11 (green line) will be so large by 2021 as to make the current confidence level in the establishment IPCC forecasts untenable."

That is a quite clear and near prediction, I might even be around to see it.

Reply

jose palmer August 31, 2017 at 3:13 AM

Everything in detail, I like this blog and I bookmarked it.
Heating and Cooling Mississauga

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